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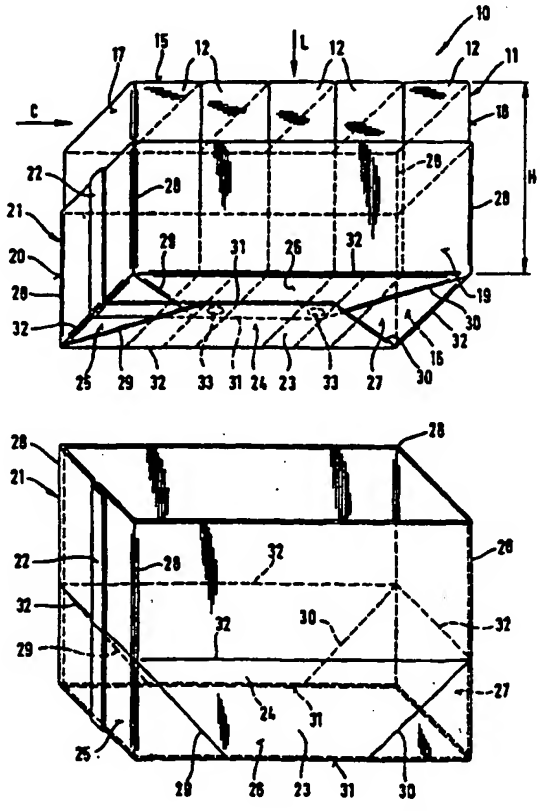
(57) Abstract

A package (10) comprising an array (11) of at least two substantially parallelepipedal packs (12), said packs (12) comprising compressed flexible articles (14) encased in a flexible bag (13), characterised in that a flexible paper covering (21) is diposed adjacent whole of bottom panel (16) and a substantial part of side panels (17, 18, 19, 20) corresponding to at least 30 percent of height H of said array (11), said paper covering (21) being held under tension around said array (11) so as to create a strong and protective outer casing for said array (11).



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FLEXIBLE PAPER COVERED PACKAGE AND PROCESS FOR PRODUCING SAME

Field of the invention

The invention relates to an array of packs comprising compressed flexible articles encased in flexible bags which are covered by a flexible paper covering to form a package and to a process for wrapping the flexible paper covering under tension around the array of packs.

Background to the invention

It is widely known in the art to pack an array of packs comprising compressed flexible articles encased in flexible bags in cardboard cases for ease of handling, storage and transport. Cardboard, however, is heavy, requires space and has less flexibility for storage since it is rigid and in use continues to occupy the same amount of space even when nearly empty. The space inside these cardboard cases cannot be fully utilised because of the variations in the pack dimensions resulting from the production processes and the tolerances imposed by the usual automatic mechanical packaging systems. The problem of utilisation of space is becoming more and more important with the increasingly widespread use of pallets of standard dimensions resulting from the demands of large manufacturing, distribution and sales organisations. Furthermore, due to the deviations in the pack dimensions resulting from the packing of compressible flexible articles into flexible bags, the cardboard cases need to be over-dimensioned. As a consequence of this over-dimensioning,

arrays of packs on the bottom of pallets are incapable of supporting the imposed loads when pallets of products are stacked or grouped three pallets high. Therefore, the cardboard cases must be designed to support the extra loads.

Prior art developments include WO 94/00362 which discloses a plurality of flexible packs placed side by side and held together by means of detachable adhesive tapes. The configuration avoids the use of corrugated cardboard boxes, but offers little in terms of support, stability and protection for the plurality of packs. Consequently, damage can occur quite easily.

EP-0-313-721-B1 discloses a process for erecting packaging on rigid cubic material. The method uses a set of constructional elements produced from packaging cardboard blanks fitted with adhesive flaps and results in the formation of at least one flat basal frame structure constructed without a packaging base. A reduction in the level of packaging material occurs and improved stability results, but the main aim of the invention is to use packaging cardboard and not paper as a packaging material.

EP 0 477 487 B1 discloses a process for producing a package consisting of a dimensionally stable framework with at least one open frame section which supports the material to be packed at the base. In particular, a strip of stiff, stretchfree packaging material is pulled off a supply roll, placed tightly with its edge projecting against the material to be packed, closed to form a surrounding strap and folded angled inwards into the basal plane of the material to be packed. Similarly, a reduction in the level of packaging material results. Nevertheless, the main aim of this invention is to produce a stable framework supporting the material to be packed without using constructional elements. Cardboard is the only example given as a packaging material.

EP 0 675 042 A1 claims a process leading to a rigid package comprising two spaced apart surrounding straps at the top and the bottom of the material to be packed, namely a tray-forming packaging material strip and a top hoop packaging material strip. The end product comprising separated strips is in contrast to the integral wrapping system of the present invention.

Arrays of packs of flexible articles can also be wrapped in plastic foil. The plastic foil can comprise relatively inexpensive materials such as polymeric films or thermoplastic films. Nevertheless, problems exist concerning the severity of the

disposal problem from an environmental standpoint both with respect to the amount of wrapping material required and the disposability/degradability of the particular wrapping material. Paper offers an attractive alternative by being fully biodegradable and recyclable.

The prior art therefore does not teach an integral wrapping system which eliminates the need for cardboard and plastic foil as a packaging material, which is independent of fixed dimensioned cases and which exploits the compressibility of an array of packs to form a stable unit.

Object and summary of the invention

The object of the present invention is to provide a package for compressed flexible articles such as disposable absorbent diapers, sanitary articles, incontinent pads or briefs, bandages and the like comprising a flexible paper covering, which functions as a strong, stable and protective outer casing for the array of packs of flexible articles. In another aspect of the invention, a process for wrapping a paper covering under tension around the array of packs of compressed flexible articles is described.

The present invention eliminates cardboard and plastic foil as a packaging material by making use of a flexible paper covering, which is wrapped under tension around a substantial part of an array of packs of compressed flexible articles. This subsequently leads to several benefits namely, the creation of a strong and protective outer casing for the array of packs of flexible articles; a reduction in the overall weight of the packages to be handled, stored and transported; a decrease in the level of waste packaging material; an increase in the level of recyclable material and an improved and optimised pallet fit during handling, storage and transport operations.

In accordance with the object of the invention, a package comprising an array of at least two substantially parallelepipedal packs comprising compressed flexible articles is provided. The package has a top and a bottom panel and four side panels. The package also comprises a flexible paper covering, which is disposed adjacent to the whole of the bottom panel and a substantial part of the side panels corresponding to at least 30 percent of the height H of the array. The paper covering on the bottom panel can comprise either four diagonal fold lines and an attachment means or a completely uninterrupted panel. For the paper covering on the bottom panel comprising four diagonal fold lines, one of the side panels comprises a seam and an attachment means and for the paper covering on the bottom panel comprising the

completely uninterrupted panel, each of the side panels perpendicular to the direction of compression comprise two fold lines and an attachment means. The paper covering is held under tension around the array so as to create a strong and protective outer casing for the array and the paper covering is preferably of a basis weight of less than 200 grams per square metre. The package may comprise a least one unobstructed opening feature in the side panels. For stability purposes, when stacking packages on top of each other to form a unit in such a manner that the top panel of the flexible bags of the arrays of the packs are placed in contact with the paper covering of the bottom panel of the arrays of packs, adhesive or adhesive sheets can be used.

The underlying principle of the wrapping process is described and it can be modified to encompass the different wrapping embodiments.

According to the present invention, the objects are achieved by a package and a process having the characteristics specified in the claims.

Brief description of the drawings

The invention will be described hereinafter with reference to the following drawings:

Figure 1 shows a pack comprising compressed flexible articles encased in a flexible bag;

Figure 2 is a perspective view of an array of five packs and a flexible paper covering with folding occurring on the bottom panel;

Figure 3 is a perspective side view of an alternative configuration of an array of five packs and a flexible paper covering with folding occurring on the side panels;

Figure 4 details a perspective view of the process for the package described in figure 2.

Detailed description of the invention

Figure 1 shows a pack **12** comprising compressed flexible articles **14** encased in a flexible bag **13**. The substantially parallelipedal packs **12** are arranged in an up-on-base configuration. Other configurations such as flat-on-face and up-on-side are also possible. The compressed flexible articles **14** may comprise disposable absorbent

diapers, sanitary articles, incontinent pads or briefs, bandages and the like. The flexible articles **14** are compressed to between 20 and 70 percent of their uncompressed volume in a direction of compression **C**. In particular, figure 1 shows a diaper pack **12** comprising between eight to fifty disposable absorbent diapers **14** and a plastic bag **13** with a thickness ranging from 30 to 120 micrometres. A method for the compression packing of disposable absorbent diapers into flexible bags has been described in detail in the following patents US 4,934,535, US 4,966,286, US 5,022,216, US 5,050,742 and US 5,150,561.

As is displayed in figure 2, the packs **12** are arranged in the form of an array **11** before transport and storage. An array **11** usually comprises at least two substantially parallelipedal packs **12**. More specifically, figure 2 shows a perspective view of a substantially covered array **11** comprising five substantially parallelepipedal packs **12** of the type shown in figure 1. The substantially covered array forms the package **10**. For the purposes of transport and storage, a number of packages **10** can be stacked or grouped in a plurality of configurations to form a unit on a pallet such that a load **L** is applied to a top panel or to a side panel of the unit with the direction of the load **L** being perpendicular to the direction of compression **C**, which is around the circumference of the unit. The packages are less compressible in directions perpendicular to the direction of compression **C**.

In figure 2, the package **10** comprises a top panel **15**, a bottom panel **16** and side panels **17**, **18**, **19**, **20**. The package **10** also comprises a paper covering **21**, which is wrapped around the side panels **17**, **18**, **19**, **20** of the array **11** of height **H** and maintained in a fixed configuration by a seam **22** on one of the side panels **17**, **18**, **19**, **20**. The paper covering can be selected from, for example, kraft, virgin kraft or recycled paper and can have a basis weight of less than 200 grams per square metre and more preferably in the range from 80 to 130 grams per square metre. The paper covering **21** does not extend more than 5 percent and preferably not more than 0.5 percent in length when being wrapped around the array **11** of packs **12**.

The paper covering **21** has a height which corresponds to at least 30 percent of the height **H** of the array **11**. This percentage can vary depending on how the packs are configured in the array **11** whether flat-on-face, up-on-base or up-on-side. For the first configuration, a height **H** of 65 percent is possible, but 70 percent is preferred. For the remaining two configurations, a height **H** of 30 percent is possible, but 70 percent is preferred. By tightly wrapping the paper covering under tension around

the array 11 of packs 12 such that a reduction in the circumference occurs in the range from 3-5 percent, the stability of the array 11 is improved without resulting in a deterioration of the substantially parallelepipedal shape of the array 11. Furthermore, a strong and protective outer casing for the array 11 is created, which guarantees stability.

The paper covering 21, as shown in figure 2, comprises a section 23 that extends beyond the bottom panel 16 of the array 11. The section 23 of the paper covering 21 comprises four subsections 24, 25, 26, 27 bounded by corner fold lines 28. The subsections 24 and 26 comprise two diagonal fold lines 29, 30 extending from the corner fold line 28 to a free edge 31. The subsections 25, 27 are folded along the fold line 32, which coincides with the lower peripheral edge of the array 11. The subsections 24, 26 are folded along the fold line 32 and along the diagonal fold lines 29, 30 to form an overlapping section on the bottom panel 16. The fold lines of the subsections 24, 26 are maintained in a fixed configuration by an attachment means 33. The attachment means 33 may comprise any variety of means such as stapling, welding, adhesion, bonding, gluing or mechanical fastening. For example, adhesive strips, beads or patches of adhesive comprising a hot melt adhesive are suitable.

Figure 3 shows a perspective side view of a different embodiment with regard to the paper covering 21 of a substantially covered array 11 comprising five substantially parallelepipedal packs 12 of the type shown in figure 1. A paper covering 21 is wrapped around the bottom panel 16 and folded along the fold lines 32 to form a completely uninterrupted bottom panel 16. The fold lines 32 coincide with the lower peripheral edge of the array 11. The paper covering 21 is of an area approximately 30 percent greater than the area of the bottom panel 16 to be covered. The subsections 34, 35 are subsequently wrapped against the side panels 19, 20 of the array 11 of the package 10; the subsections 34 and 35 having a height which comprises at least 30 percent, preferably 70 percent of the height H of the array. This is also applicable to the up-on-side configuration. For the flat-on-face configuration, 65 percent is possible, but 70 percent is preferred. The subsections 36, 37 comprise diagonal fold lines 38, 39 extending from the corner of the free edge 41 to the fold line 32. The subsections 36 and 37 are folded along the fold line 32 and along the diagonal lines to cover a substantial part of the height of the side panels 17, 18. In addition, the subsections 36, 37 can also be folded onto the side panels 19, 20 and tucked underneath the subsections 34, 35. Furthermore, the direction of the folds at each corner of the free edge 41 can all be oriented in one direction or in

different directions. The fold lines of the subsections **36, 37** are maintained in a fixed configuration by an attachment means **33.**

The paper covering **21** may also comprise the optional feature of an unobstructed opening feature **42**, which is readily located and which can be easily and reliably opened in order to gain easy access to the packs **12** within the array **11** of the package **10** for price marking and display purposes. The paper covering **21** comprises at least one unobstructed opening feature **42**, which may comprise a predetermined tear portion in the form of a line of weakness. Lines of weakness can be formed by many means well known in the art and typically comprise, for example, perforations. In addition, the unobstructed opening feature **42** may comprise a plastic thread in conjunction with a tear tab, which is located on the surface of the paper covering **21**. The combination of the plastic thread and the tear tab does not result in any weakening of the paper covering **21**. The unobstructed opening features are preferably positioned on the paper covering **21** in a substantially spaced relation to each other and are generally in the form of a thumb shape though other shapes are possible. Typical dimensions for the diameter range from 20-60 millimetres. In addition, graphical indicia may be provided on the paper covering **21** to highlight the location of the opening feature **42**.

According to the other aspect of the invention, a process for wrapping the array **11** of packs **12** with a paper covering **21** to form the package **10** encompassing the embodiments described above is provided. In general, the process involves the following steps:

a) supplying the array **11** of packs **12** on a feed conveyor **50** to a packaging station **51**;

b) pulling a paper covering **21** from a supply roll **52**;

c) feeding the paper covering **21** to the packaging station **51**;

d) moving the array **11** along the packaging station **51** transverse to the paper covering **21** onto a discharge conveyor **53** in such a manner that the bottom **16** and side panels **17, 18, 19, 20** are surrounded with the paper covering **21**;

e) applying the attachment means **33** in the appropriate manner to form the package **10**.

More particularly, the array **11** to be wrapped is moved along the packaging station **51** towards the paper covering **21** (consider, for example, that the side panel **18** faces the paper covering **21**), which is transverse to the path of movement of the array **11**.

A pusher clamp is used to hold the array **11** in place. The paper covering **21** is wrapped around the array **11** in a U-shape and pulled by means of a pull force **F** such that the two edges of the side panel **17** of the array **11** are deformed. A pusher plate pushes on the upper panel **15** of the array **11** to prevent the paper covering **21** from slipping backwards. The third edge of the side panel **18** is deformed with a metal plate. The action of the metal plate results in the formation of round edges and produces the same effect as the paper covering **21** does by means of the pull force **F**. The pusher clamp retreats. The fourth edge of the side panel **18** is deformed with a roller. The circumference of the array **11** is reduced by at least 3 percent depending on the product and the size of the array **11**. The paper covering **21** is cut perpendicular to the direction of the paper feed and the final step involves the application of an attachment means **33** with the aid of a roller. The pusher plate retreats. At least three edges of the array **11** have to be deformed before the application of the attachment means **33**. The deformed edges act like springs and keep the paper covering **21** under tension and thus, ensure the stability of the package **10**.

This represents the underlying principle of the wrapping process and can be modified to take account of the different wrapping configurations described herein. Furthermore, the process can be used both to completely wrap an array of packs to form a package and a stack or grouping of packages to form a unit.

For ease of handling, transport and storage, the packages **10**, wrapped according to the present invention, are stacked in a plurality of configurations to form a unit disposed on a pallet. Glue or adhesive coated sheets can be employed to stabilise the unit. In particular, pressure sensitive glue, as supplied by Actio-pack® of Germany, is sprayed on the top panel **15** of the flexible plastic bags **13** of the arrays **11** of packs **12** and placed in contact with the paper covering **21** of the bottom panel **16** of the arrays **11** of packs **12**. In order to minimise the quantity of glue on the plastic bags **13** and to maintain sufficient unit stability, glue beads of approximately 3 centimetres diameter located close to the corners of the package **10** are employed. Alternatively, adhesive coated palletisation insert sheets Stop Gliss®, as supplied by ENDUPACK of France, are disposed between the packages to ensure stability. The same anti-slip compound can be coated on both sides of the palletisation insert sheets or different anti-slip compounds can be coated on each side to meet the frictional/stabilising requirements of each material.

Glossary

10	package
11	array
12	pack
13	flexible bag
14	compressed articles
15	top panel
16	bottom panel
17, 18, 19, 20	side panels
21	paper covering
22	seam
23	section
24, 25, 26, 27	subsections
28	corner fold line
29, 30	diagonal fold lines for 26, 27
31, 41	free edges
32	fold line
33	attachment means
34, 35, 36, 37	subsections
38, 39	diagonal fold lines for 36, 37
42	unobstructed opening feature
50	feed conveyor
51	packaging station
52	supply roll
53	discharge conveyor

Claims

1. A package (10) comprising an array (11) of at least two substantially parallelepipedal packs (12), said packs (12) comprising compressed flexible articles (14) encased in a flexible bag (13), said compressed flexible articles (14) having been compressed to between 20 percent and 70 percent of their uncompressed volume in a direction of compression C, said array (11) comprising a top panel (15), a bottom panel (16) and four side panels (17, 18, 19, 20),
characterised in that
a flexible paper covering (21) is disposed adjacent whole of said bottom panel (16) and a substantial part of said side panels (17, 18, 19, 20) corresponding to at least 30 percent of height H of said array, said paper covering (21) being held under tension around said array (11) so as to create a strong and protective outer casing for said array (11).

2. A package (10) according to claim 1 wherein said bottom panel (16) comprises four diagonal fold lines and an attachment means to maintain said diagonal lines in a fixed configuration.

3. A package (10) according to claim 2 wherein one of said side panels (17, 18, 19, 20) comprises a seam (22) and an attachment means to maintain said seam (22) in a fixed configuration.

4. A package (10) according to claim 1 wherein said bottom panel (16) comprises a completely uninterrupted panel.

5. A package (10) according to claim 4 wherein each of said side panels (17, 18) perpendicular to the direction of compression C comprises two fold lines and an attachment means to maintain said fold lines in a fixed configuration.

6. A package (10) according to any of the previous claims wherein said paper covering (21) comprises paper of a basis weight of less than 200 grams per square metre.

7. A package according to any of the previous claims, wherein said paper covering (21) comprises at least one unobstructed opening feature (42) in said side panels (17, 18, 19, 20) in a substantially spaced relation to each other.

8. A package according to any of the previous claims, wherein said compressed flexible articles (14) are disposable absorbent diapers, sanitary articles, incontinent pads or briefs, bandages and the like.

9. A package according to any of the previous claims, wherein said package (10) is stacked with other packages (10) to form a unit in such a manner that said top panel (15) of said flexible bags (13) of said arrays (11) of said packs (12) are placed in contact with said paper covering (21) of said bottom panel (16) of said arrays (11) of said packs (12) by means of an adhesive or an adhesive sheet.

10. A process for producing a package (10) according to claims 1 to 9 comprising the following steps:

a) said array (11) of said packs (14) to be packed is supplied on a feed conveyor (50) to a packaging station (51);

b) said paper covering (21) is pulled off a supply roll (52);

c) said paper covering (21) is fed to said packaging station (51);

d) said array (11) is moved along said packaging station (51) transverse to said paper covering (21) and onto a discharge conveyor (53) in such a manner that said bottom panel (16) and said side panels (17, 18, 19, 20) of said array (11) are surrounded with said paper covering (21);

e) said attachment means (33) is applied.

11. A process according to claims 10, 1, 2 and 3 wherein at least three edges of said array (11) are deformed before said attachment means (33) are applied.

12. A process according to claim 11 wherein circumference of said array (11) is reduced by at least 3 percent.

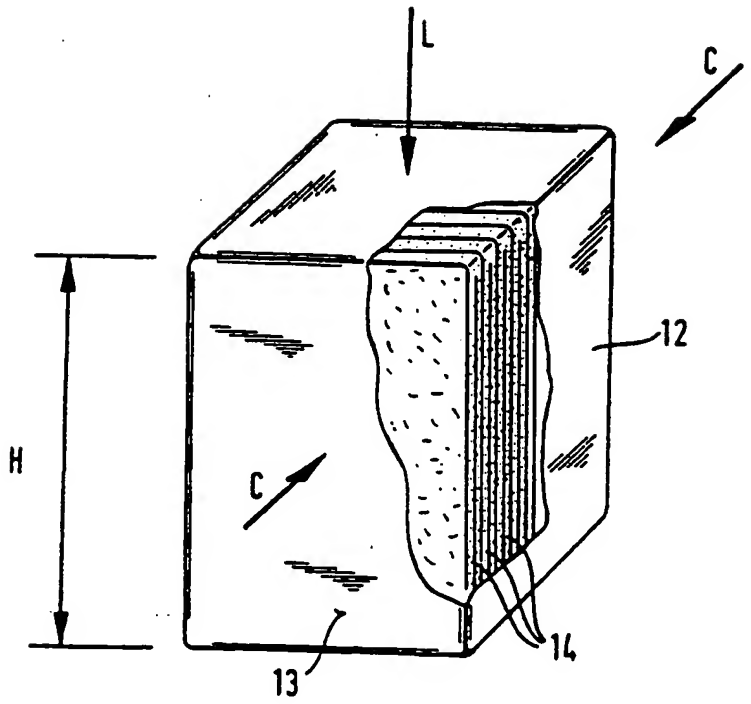

Fig. 1

Fig. 2

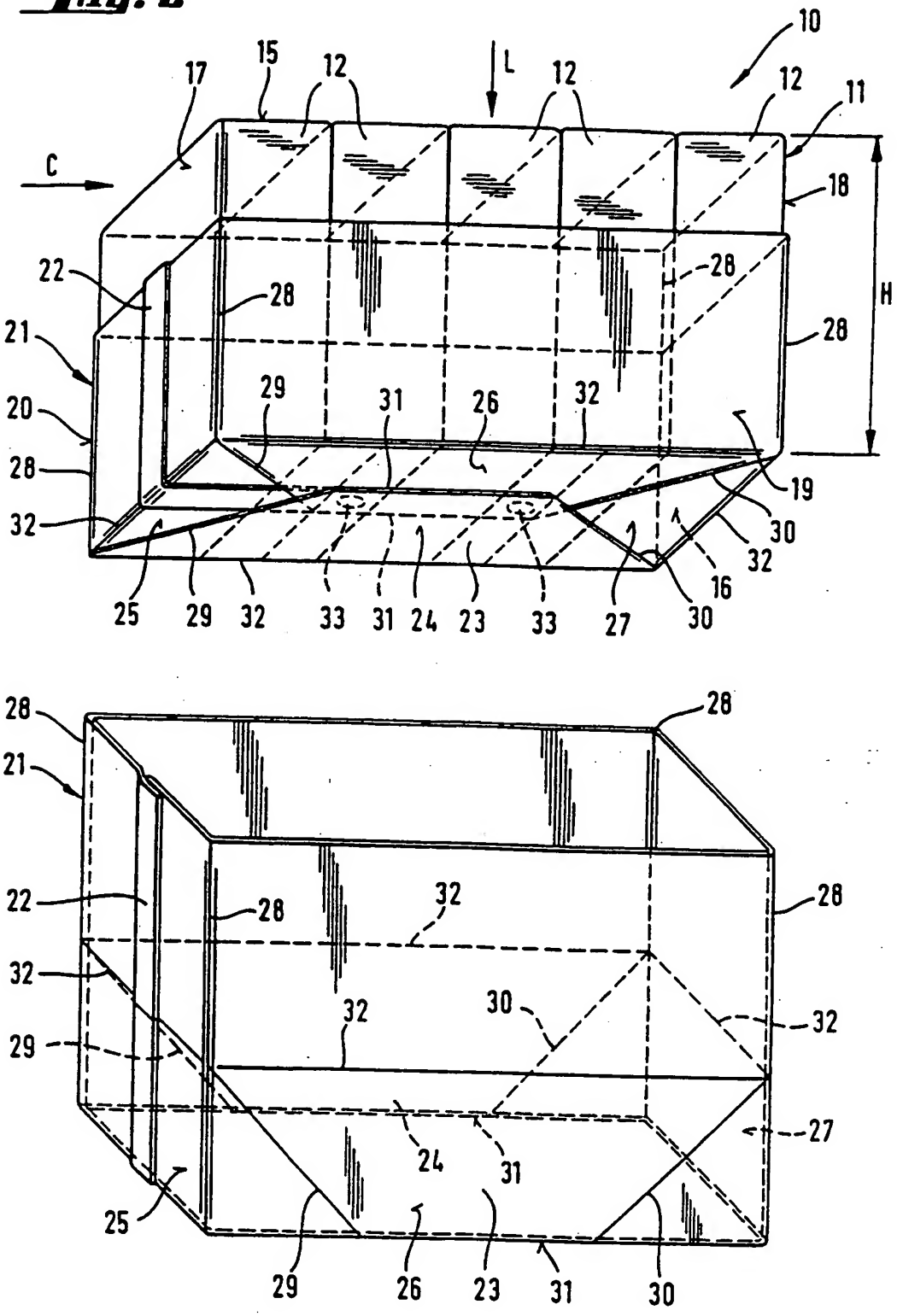
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Fig. 3

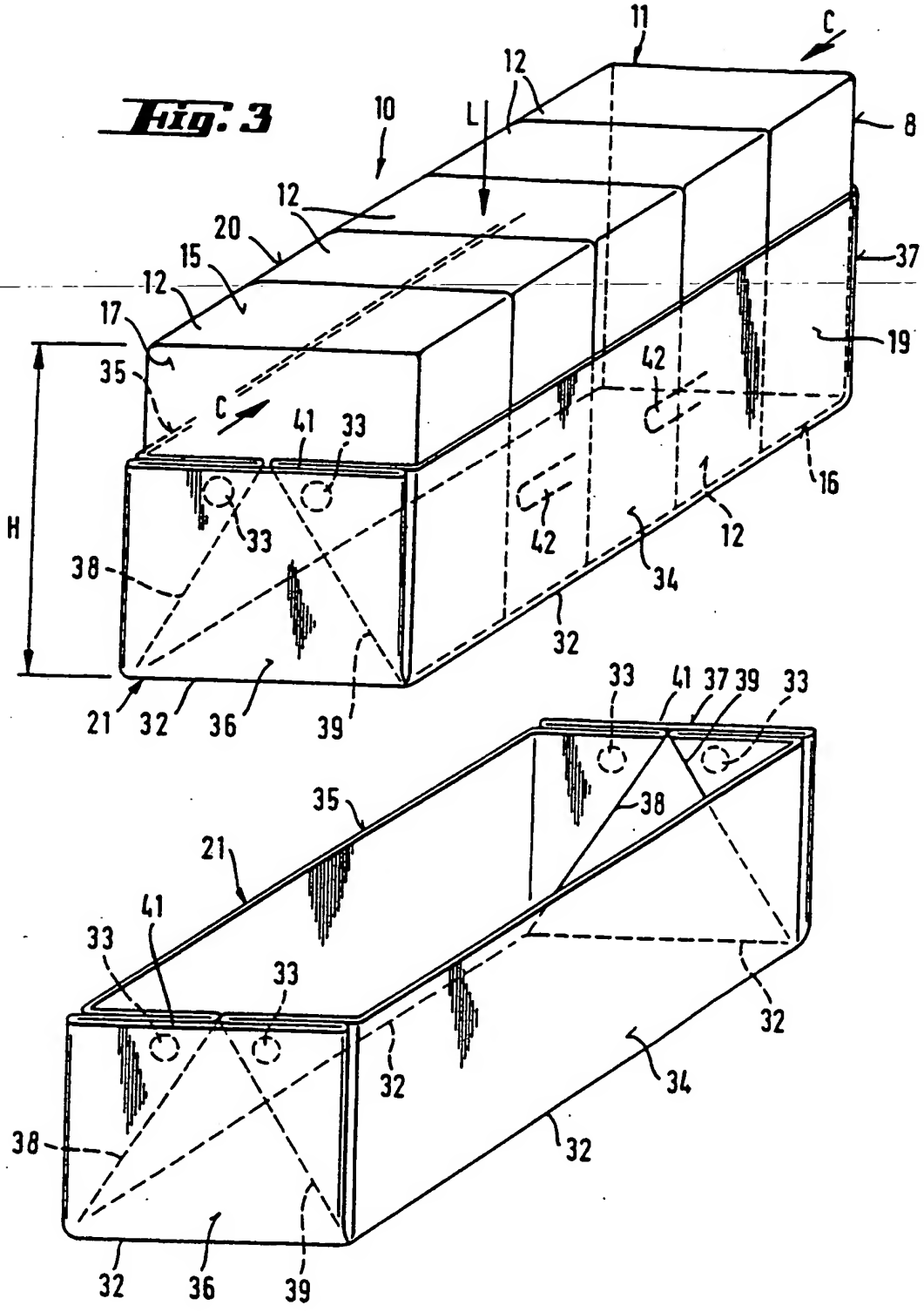
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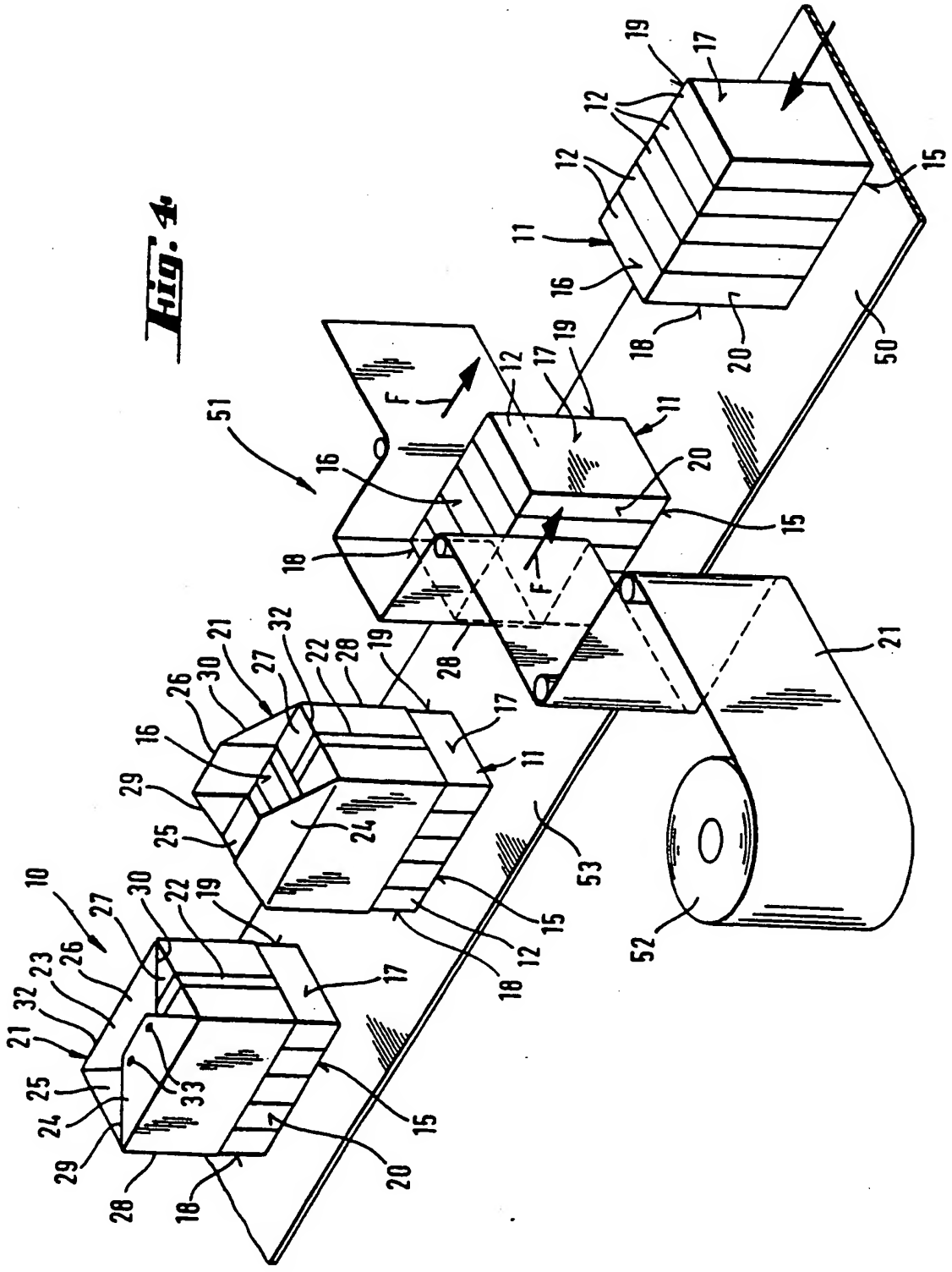
Fig. 4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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/09673

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B65D 65/10
US CL :206/494; 229/87.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 206/494; 229/87.01

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 3,330,089 (UEMATSU) 11 July 1967	NONE
A	US, A, 4,555,017 (BLACKMORE) 26 November 1985	NONE
A	US, A, 3,809,235 (EDWARDS ET AL.) 07 May 1974	NONE
A	US, A, 5,036,978 (FRANK ET AL.) 06 August 1991	NONE
A	US, A, 5,048,687 (SUZUKI ET AL.) 17 September 1991	NONE
A	US, A, 5,054,619 (MUCKENFUHS) 08 October 1991	NONE

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 AUGUST 1996	18 SEP 1996

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	for STEPHEN P. GARBE Sheila Veney Paralegal Specialist Group 3200
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Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/09673

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5,065,868 (CORNELISSEN ET AL.) 19 November 1991	NONE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/09673

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 7-12
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.